THE DIFFUSION OF THE EMERGING RMA IN ASIA: A PRELIMINARY ASSESSMENT

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This project has examined the efforts of five Asian militaries – Australia, China, Japan, Taiwan, and Singapore – to exploit the information revolution. Two are U.S. allies, two are friendly, and one is a competitor and potential adversary. Influential groups within each military favor harnessing the information revolution to overcome existing problems and gain new benefits. These five cases nonetheless display considerable variation in terms of both the extent and nature of their exploitation of the emerging revolution in military affairs (RMA). While Asian militaries have paid close attention to U.S. debates regarding the emerging RMA and frequently adopt U.S. terminology in their own discussions of future warfare, none has sought to import U.S. methods wholesale. Rather, each has begun to develop its own, unique approach to information-age warfare. Each also faces considerable barriers to exploiting the emerging RMA. As a result, any assessment of the spread of the RMA in Asia should include consideration of alternative futures.

This essay begins by describing the paths along which information-age warfare methods are spreading within Asia. It then summarizes the pattern of innovation in the five militaries that we studied. It examines the drivers of and barriers to pursuing the RMA among the five militaries. It concludes with a series of scenarios describing alternative futures based upon the extent of U.S. progress in exploiting the RMA and the threat environment in the region.

PATHS OF DIFFUSION

The United States currently sits at the apex of the international military hierarchy. The U.S. armed forces are in many ways the acme of a modern military. They have taken the lead in fielding information, stealth, and precision technologies. They have also spent considerable effort developing innovative doctrine and organizations. In conflicts over the past decade U.S. forces have repeatedly overwhelmed less capable adversaries while suffering negligible to nonexistent casualties. They have demonstrated the ability to strike globally with precision at night and in all weather. In addition, there is a widespread perception – accurate or inaccurate – that they have employed information warfare (IW) extensively in recent conflicts.

Despite such impressive capabilities, and despite the attention the United States has accorded to developing new ways of war, a concrete U.S. "model" of a "post-RMA military" has yet to emerge.[1] While American defense analysts frequently speak in terms

[1] In this respect I disagree with Chris Demchak, "Complexity and a Midrange Theory of Networked Militaries" in Theo Farrell and Terry Terriff, eds., The *Sources of Military Change: Culture, Politics, Technology* (Boulder, CO: Lynne Rienner, 2002).

of "network-centric warfare" and "effects-based operations", for example, such concepts remain amorphous. Indeed, even within the Defense Department there is considerable debate over what weapons, concepts, and organizations are truly "transformational". The U.S. armed forces have yet to establish an information-age equivalent of the *Blitzkrieg* or – more concretely – the *Panzer* division: a well-defined set of concepts and organizations tailored to waging war in the information age. As a result, no single model exists for other states to adopt or counter.[2] While U.S. thinking regarding the RMA exerts leverage, it is as ideas to be studied rather than techniques to be copied.[3] Absent a battle-tested model, the variation and asymmetry among militaries in the region will grow over time.

Influential groups in each of the militaries that we examined believe that the growth and diffusion of information technology will bring about an RMA. And each of the states has expressed considerable interest in U.S. approaches to information-age warfare. Rhetorically, each military uses the term "revolution in military affairs" even if, as noted below, it does not view the U.S. approach to exploiting the emerging RMA as being wholly applicable to its circumstances. It is worth noting, however, that a consensus in favor of pursuing the RMA does not exist in any of the militaries that we examined. Rather, in each there exist various schools of thought about force modernization and future warfare. RMA advocates are quite often in the minority, even if in some cases they enjoy high-level support.

In a number of cases, Asian militaries have imported U.S. terminology in an effort to identify new approaches to combat. Perhaps the best example of this is the term "information warfare", which while used widely connotes many different things to many different people. It is not, however, a lone instance. As James Mulvenon notes in his essay, Taiwan's military frequently uses such terms as "precision strike", "dominant maneuver", and "information warfare" in discussions of future warfare. Similarly, the Royal Australian Navy has expressed interest in "network-centric warfare" and the Royal Australian Air Force is pursuing "effects-based operations" (or EBO). However, such rhetorical similarity often masks important conceptual differences. The RAAF's concept of EBO, for example, is much more comprehensive than that espoused by the U.S. Navy and Air Force, involving the use of all elements of national power. Indeed, Australian air force officers frequently criticize the U.S. approach to EBO as being too military and tactical in its focus. Assessments of foreign military concepts must delve beneath such surface-level similarities to expose differences in the meaning of these terms to different defense establishments.

U.S. concepts of information-age warfare have spread through several channels. First, Asian armed forces have paid close attention to American books and articles about the emerging RMA. Foreign writings about future warfare frequently lean heavily upon U.S.

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[2] On the diffusion of German combined-arms armored warfare methods and organizations, see Thomas G. Mahnken, "Beyond *Blitzkrieg*: Allied Responses to Combined-Arms Armored Warfare During World War II" in Emily O. Goldman and Leslie C. Eliason, eds., *Adaptive Enemies, Reluctant Friends: The Impact of Diffusion on Military Practice* (Stanford: Stanford University Press, 2003).

[3] It is worth noting, for example, that all the "strategists" cited in the chapter devoted to "strategists and the revolution in military affairs" in the Australian Defence Studies Centre's textbook on strategy are Americans. See Steven Metz, "Strategists and the Revolution in Military Affairs" in Hugh Smith, ed., *The Strategists* (Canberra: Australian Defence Studies Centre, 2001), ch. 9.

sources. Articles by such defense analysts as Eliot Cohen, Andrew Krepinevich, John Arquilla, and William Owens feature prominently in foreign writings about future warfare. Early conferences on the RMA featured a veritable who's who of American RMA advocates from government, defense industry, and academia.[4] Much as Basil Liddell-Hart and J.F.C. Fuller influenced how armies across the globe approached armored warfare during the 1920s and 1930s, American RMA advocates are shaping how other militaries approach information-age warfare.[5] The same is true of official U.S. documents on future warfare. Indeed, one suspects that official pronouncements such as *Joint Vision 2010* receive more attention outside the U.S. military than inside it.

A second way that U.S. concepts have spread is through military-to-military contacts. U.S. allies such as Australia and Japan maintain close ties to the U.S. armed forces, and these provide an important channel for them to learn about U.S. activities. The Australian government has followed closely U.S. speculation and experimentation regarding emerging warfare areas. The Australian Department of Defense has maintained a close relationship with the Pentagon's Office of Net Assessment. In addition, the ADF has a liaison officer at U.S. Joint Forces Command. The Australian Army has followed the U.S. Army's "Army After Next" program quite closely.[6] The Royal Australian Navy has participated extensively in the U.S. Navy's Global War Game. And Australian officers routinely participate in U.S. war games and field exercises as well. Japan similarly maintains close ties to the U.S. armed forces. Japan Self-Defense Force (JSDF) officers attend U.S. professional military education institutions. In addition, the Japan Maritime Self-Defense Force (JMSDF) has a liaison at the Navy Warfare Development Command. Japan also participates in a range of bilateral and multilateral exercises and war games.

Those states that lack a formal alliance with the United States have had less of an opportunity to glean insights from military-to-military exchanges. For example, Arthur Ding argues that Taiwan's diplomatic isolation has limited its exposure to western militaries. Still, they maintain a range of contacts with the U.S. armed forces, including by sending officers to attend U.S. war colleges. As a result, James Mulvenon concludes that military-to-military ties have in fact played an important role in shaping Taiwanese views of the RMA.

While the United States today offers the most prominent source of thinking about information-age warfare, it is not the only one. It is worth remembering that the U.S. government first became aware of the concept of an RMA through its analysis of Soviet military writings. Indeed, it was Soviet military scientists who pioneered the concept in the 1950s in an attempt to come to grips with the dramatic changes in the conduct of war that had come about due to the advent of nuclear weapons and ballistic missiles. And it was Soviet defense analysts who first argued that the information revolution was bringing

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[4] See, for example, the proceedings of the first Australian RMA conference in Keith Thomas, ed, *The Revolution in Military Affairs: Warfare in the Information Age* (Canberra: Australian Defence Studies Centre, 1997).

[5] Indeed, Liddell-Hart and Fuller had greater influence abroad than in Britain. See Azar Gat, "British Influence and the Evolution of the Panzer Arm: Myth or Reality? Part I," *War in History* 4, no. 2 (April 1997) p. 160 and *passim*

[6] See, for example, Lieutenant Colonel Greg de Somer, *The Implications of the United States Army's Army-After-Next Concepts for the Australian Army*, Land Warfare Studies Centre Working Paper no. 104 (Canberra: Land Warfare Studies Centre, June 1999).

about a new RMA. Over time Soviet, then Russian, thinking regarding future warfare became quite advanced.

Other militaries, such as those of China and India, have paid close attention to Soviet writings on future warfare. As You Ji notes, Chinese military scholars first encountered the concept of the revolution in military affairs through their contact with Soviet military thinking. Soviet and Russian writings regarding information-age warfare have influenced the Indian military as well.[7]

Each of the states that we examined has paid close attention to the battlefield performance of U.S. forces in the Gulf War, Bosnia, Kosovo, and Afghanistan. U.S. allies have had the advantage of participating in these conflicts. Australian forces, for example, have fought side-by-side with American troops in the Gulf War and Afghanistan, while the JMSDF has deployed forces to the Persian Gulf in support of Operation *Enduring Freedom*. This experience has doubtless given them considerable insight into U.S. capabilities. Nor are they alone. The Chinese military, for example, has studied the U.S. military's performance in recent wars extensively.

PATTERNS OF DIFFUSION

As Emily Goldman discussed in the first chapter of this study, military organizations develop new approaches to combat in three distinct but often overlapping phases, which may be termed transmission, adoption, and assimilation, or speculation, experimentation, and implementation. We applied this model to the five Asian militaries we examined in this study. Based upon insights derived from the papers we commissioned for the project, we added two indicators to the list: leadership consensus in favor of new warfare methods, and the allocation of resources to support them. Table 1 summarizes the result.

[7] On India's approach to the emerging RMA, see Thomas G. Mahnken and Timothy D. Hoyt, "Indian Views of the Emerging Revolution in Military Affairs," *National Security Studies Quarterly* 6, no. 3 (Summer 2000).

	Australia	China	Japan	Singapore	Taiwan
Speculation					
Publications describing potential new combat methods	**X**	**X**	**X**	**X**	**X**
Establishment of official organizations to study recent wars	**X**	**X**	**X**	**X**	**X**
Study of foreign innovation efforts	**X**	**X**	**X**	**X**	**X**
Experimentation					
Establishment of organization(s) charged with experimentation	**X**			**?**	**X**
Formation of experimental military units	**X**	**?**		**?**	**X**
Experiments with new warfare methods	**X**	**X**		**X**	**X**
War gaming of new warfare methods	**X**	**X**			**X**
Implementation					
Leadership consensus in favor of new warfare methods	**X**	**X**		**X**	
Allocation of resources to support new warfare methods	**X**	**X**		**X**	
Development of formal transformation strategy	**X**	**?**		**?**	
Establishment of innovative military units	**X**	**X**			**X**
Revision of doctrine to accommodate new ways of war					
New branches, career paths		**X**			
Field training exercises with new doctrine, organizations					

Table 1. Indicators of innovation in Asia

Australia

To date, Australian authors have conducted a number of studies of the future security environment and emerging warfare areas. In April 1999 the Australian government established the Office of the Revolution in Military Affairs within the Department of Defense to review the development of advanced technology and develop a strategy to extract the maximum value of the RMA for the Australian Defense Force (ADF). The department subsequently promulgated a draft discussion paper on the Revolution in Military Affairs and the ADF. Each of the services formed a dedicated futures directorate. They have also conducted experiments to explore new technology, doctrine,

and organizations. And they have formed several units dedicated to new mission areas, most notably a 90-man information operations squadron in the Royal Australian Air Force.

While Australia has entered into a protracted and detailed dialogue with the United States regarding the RMA, this process has yielded an Australian approach to information-age warfare that differs markedly from that of the United States. While the Australian Department of Defense initially adopted the term "Revolution in Military Affairs", it soon dropped it in favor of the term "Knowledge Edge" as a means of emphasizing Australia's unique approach. As the 1997 publication *Australia's Strategic Policy* defines it, the Knowledge Edge is "the effective exploitation of information technologies to allow us to use our relatively small force to maximum effectiveness."[8] As Paul Dibb notes, Australian strategic analysts believe that the American method of exploiting the RMA is poorly suited to Australia's circumstances. In particular, they see the U.S. approach as lying far beyond Australia's limited fiscal and technological means.

The ADF has emphasized advanced intelligence, surveillance, and reconnaissance capabilities. The Defense Science and Technology Organization has established the *Takari* program to ensure that the ADF has an integrated C^3I and information operations capability. It has created the position of Chief Knowledge Officer to manage these assets. The first occupant of the position, Air Vice Marshal Peter Nicholson, was an early proponent of RMA in Australia. As Paul Dibb notes, expenditure on command and control; intelligence, surveillance, and reconnaissance; electronic warfare; and smart weapons will total 30-35% of future defense expenditure. Put another way, between 2001 and 2011, the Australian military will spend A$2.5 billion on information capabilities, ranking only behind that on air combat and land forces but ahead of that on maritime forces and strike.

While Australia purchases many of its major weapon systems from the United States, the ADF has also displayed a great deal of technological innovation. One niche that Australia has pursued vigorously is over-the-horizon radar (OTHR). The Jindalee Operational Radar Network (JORN) was developed to provide a security shield for Australia's remote northern approaches. Designed to monitor air and sea movements across 37,000 km of unprotected coastline and 9 million km^2 of ocean, the network has the ability to track ships and aircraft (including stealthy ones).[9]

In at least one area, the United States has emulated an Australian innovation. In 1999, the ADF leased a high-speed ferry, re-christened the HMAS *Jervis Bay*, to support the deployment and sustainment of forces in East Timor. Inspired by the vessel's performance, the United States has leased a fast catamaran – the USS *Joint Venture* experimental high-speed vessel (HSV-X1) – from INCAT of Tasmania to explore new concepts for amphibious and special operations missions.[10] The Marine Corps has leased another Australian fast ferry – the Austal TSV 101 – for experimental purposes.

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[8] Commonwealth of Australia. *Australia's Strategic Policy 1997* (Canberra: Directorate of Publishing and Visual Communications, 1997), 56.
[9] Michael Sinclair-Jones, "JORN Assures Early Warning for Australia," *Defence Systems Daily*, February 29, 2000 at http://defence-data.com/features/fpage37.htm (accessed July 5, 2001).
[10] Admiral Robert J. Natter, "Meeting the Need for Speed," *Proceedings* 128, no. 6 (June 2002): 65-67.

The development of innovative doctrine within the ADF is, however, still in an early stage. The Army is exploring concepts for inserting forces in the face of an anti-access threat under the rubric of Maneuver Operations in a Littoral Environment, or MOLE. The services are interested in information operations and new command-and-control concepts. However, the future of these efforts remains uncertain.

Japan

Japan's limited efforts at transformation demonstrate that access to information technology is a necessary but insufficient ingredient for exploiting the RMA. China's growing power, the prospect of a conflict across the Taiwan Strait, the potential for instability on the Korean Peninsula, and uncertainty over the future role of the United States in Asia have all prodded Japan into re-examining its security requirements. Following North Korea's 1998 *Taepo-Dong I* missile test, Tokyo decided to develop its own reconnaissance satellite constellation. It has also begun to cooperate more closely with the United States on theater missile defense. Moreover, the rise to power of the Koizumi government and the global war on terrorism have led Japan to become more assertive. The deployment in late 2001 of Japan Maritime Self-Defense Force (JMSDF) warships to support Operation *Enduring Freedom* in the Persian Gulf represented a significant first.

Japan has also expressed interest in a more radical transformation of its defense posture. In December 2000, the Japan Defense Agency (JDA) released a study paper examining the implications of the information revolution for Japan.[11] The paper argued that a transformation of the Japan Self-Defense Forces (JSDF) would boost their effectiveness and reduce casualties in a future conflict. It would also improve combined operations with the United States. As the paper put it, the goal of a post-RMA military should be:

> Sharing real-time information among each unit of the Ground, Maritime, and Air-Self Defense Forces based on redundant and invulnerable information networks comprised of various sensors; securing interoperability between SDF and U.S. forces; and establishing a defense posture that could perform most efficiently with a minimum of reaction time, and could respond flexibly in accordance with rapidly changing situations.[12]

The JDA also raised the possibility of creating experimental units within the JSDF to explore new ways of war.

While Australian defense analysts see the U.S. approach to information-age warfare as too expensive, their Japanese counterparts see it as inapplicable to the political environment that governs Japan's defensive national security policy. Concepts and organizations designed to improve the speed, survivability, and lethality of power projection forces have limited applicability to a nation whose constitution prohibits it from engaging in offensive operations. As Sugio Takashashi puts it, Japan's exploitation

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[11] Office of Strategic Studies, Defense Policy Division, Defense Policy Bureau, Japan Defense Agency, *Info-RMA: Study on Info-RMA and the Future of the Self-Defense Forces* (Tokyo: JDA, December 2000)(http://www.jda.go.jp/e/pab/rma/rma_e.pdf).

[12] *Ibid*., 9.

of the information revolution should focus upon defensive capabilities, such as leveraging information technology to defend Japan against ballistic missiles. It should also improve interoperability with the United States.

China

China's efforts to exploit the emerging RMA arguably are the most focused of any of the states we examined. China's ongoing dispute with Taiwan, coupled with the prospect of U.S. intervention in a Taiwan Straits conflict, serves as a driver of Beijing's modernization efforts. Chinese analysts have paid particular attention to information warfare as a relatively cheap way of countering the technological superiority of the United States. They have also outlined concepts to counter U.S. power projection forces, particularly carrier battle groups.[13]

In China, as elsewhere, there is no unanimity over the future of warfare. Indeed, You Ji identifies three schools of thought within the PLA regarding the RMA. He notes, however, that Jiang Zemin is an RMA enthusiast and has used his power to promote likeminded officers within the PLA. As a result, Ji predicts that support for the RMA will grow over time.

Chinese military authors have devoted considerable attention to future warfare concepts. The Chinese analyst Cheng Bingwen, for example, has coined the term "no-contact warfare" to discuss how long-range precision strike systems may change the character and conduct of future conflicts. Drawing upon Operation *Allied Force*, NATO's bombing campaign over Serbia, he argues that air power will be the primary means of achieving victory in future conflicts; ground engagements will be shorter or non-existent. He predicts that future conflicts will involve the use of long-range precision strike weaponry to paralyze an enemy's command, telecommunications, and information systems; inflict heavy losses on military targets; and ultimately force it to yield. Success will depend upon identifying an adversary's vital points and weak links so that "hitting one point can paralyze a large area." [14] Indeed, Chinese theorists believe that they can employ IW to paralyze an adversary's leadership.[15]

China is attempting to harness science and technology to improve its armed forces. The Chinese military has accorded information technology the highest priority in its modernization program. China is known to be developing doctrine and concepts for IW. It is studying the offensive employment of IW against foreign economic, logistics, and C4I systems and appears interested in researching methods to insert computer viruses into foreign computer networks. [16] Chinese authors have discussed forming a "net force"

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[13] See, for example, Zhou Yi, "Aircraft Carrier Face Five Major Assassins," *Junshi Wenzhai*, March 1, 2002: 4-6.
[14] Cheng Bingwen, "Countermeasures and Thoughts for Fighting 'No-Contact Warfare' – on the Need to Refocus Our Preparations for Military Struggles," *Jiefangjun Bao* (Internet Version) in Chinese, October 4, 1999, p. 3.
[15] *Annual Report on the Military Power of the People's Republic of China, Pursuant to the FY2000 National Defense Authorization Act*, at http://www.defenselink.mil/news/Jun2000/china06222000.htm (accessed July 2000).
[16] *The Security Situation in the Taiwan Strait*, Report to Congress Pursuant to the FY99 Appropriations Bill, 12.

dedicated to conducting information operations. Moreover, the Chinese armed forces have begun incorporating information warfare into their exercises.[17]

The Chinese military's pursuit of the RMA focuses on areas that the U.S. has abandoned, such as precision-guided conventional ballistic missiles, or not interested in, such as methods to deny access to its sphere of interest. China is also pursuing so-called "assassin's mace" weapons that it hopes will give it an edge in a future conflict.

China has begun fielding a new generation of precise ballistic missiles guided by signals from the Global Positioning System (GPS) satellite constellation. These missiles give Beijing the capability to target air defense installations, airfields, naval bases, C^4I nodes, and logistics facilities. The PRC has deployed the CSS-6 (DF-15 or M-9) SRBM, a road mobile missile that can deliver a 500-kg payload to a range of 600 km. It has also developed the CSS-X-7 (M-11) SRBM, which has an estimated range of 300 km. It is also developing an improved version of the CSS-7, the CSS-7 Mod 2, with greater range. This missile will reportedly be able to carry conventional, fuel-air explosive (FAE), cluster, and electro-magnetic pulse (EMP) warheads.[18] By 2005, the PRC may have as many as 650 such missiles.[19] China has begun developing two land-attack cruise missile designs for conventional strike, programs that have a high development priority.[20] China has also reportedly purchased Israeli *Harpy* unmanned combat air vehicles (UCAVs) for defense-suppression missions.[21]

China is also developing a range of advanced technologies. Beijing is improving its space capability, including intelligence-gathering, communication, and navigation satellites. It is also believed to be developing a ground-based laser anti-satellite systems. Still, Chinese modernization efforts face a series of constraints, including an aging capital stock, widespread corruption, and weak defense industries.

Taiwan

Taiwan's approach to the RMA is predicated upon developing the means to counter China. In particular, Taiwan is emphasizing measures to offset China's missile and IW capabilities.

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[17] Wen T'ao, "PLA Bent on Seizing 'Information Control'," *Ching Pao*, June 1, 2002: 44-46.
[18] *The Security Situation in the Taiwan Strait*, 5.
[19] Bill Gertz, "China Points More Missiles at Taiwan," *Washington Times*, November 23, 1999: 1.
[20] *Annual Report on the Military Power of the People's Republic of China, Pursuant to the FY2000 National Defense Authorization Act*, at http://www.defenselink.mil/news/Jun2000/china06222000.htm (accessed July 2000).
[21] Bill Gertz, "China Deploys Drones from Israel," *Washington Times*, July 2, 2002, 1.

Taiwan is reportedly developing both a 1,000-2,000-km missile for use against deep targets and a 300-km system for striking targets along the China coast.[22] Taipei is reportedly also plans to deploy a land-attack cruise missile with a range exceeding 300 km.[23]

As Arthur Ding and James Mulvenon discuss, the Taiwanese concept of RMA places heavy emphasis upon information warfare. As Ding notes, developing IW has been a priority for Taiwan's armed forces since at least 1998. Taiwan, which manufactures nearly eighty percent of the computer chips in commercial use today, also has all the basic capabilities needed to carry out offensive IW, particularly computer network attack and the introduction of malicious code. Within the Taiwanese military, the Communications Electronic and Information Bureau has been given responsibility for IW. In November 2000, the Taiwanese Ministry of National Defense announced that it had established an IW cell the direct control of the General Staff Headquarters.[24] According to another report, the Taiwanese military has developed some 1,000 computer viruses that could be unleashed against China.[25] Taiwan has also conducted extensive research into computer network defense.[26]

Singapore

Like the other militaries in this study, the Singapore Armed Forces (SAF) have debated the merits of the RMA. As Tim Huxley notes, senior civilian and military SAF leaders are fluent in the vocabulary of the RMA. *Defending Singapore in the 21st Century*, published in February 2000, explicitly discusses the desirability of the RMA for Singapore. The SAF journal *Pointer* has contained a number of articles debating the merits of information-age ways of war.

At the strategic level, Singapore's approach to the emerging RMA is focused upon defending the small city-state against its larger neighbors. At the tactical level, the SAF seeks to acquire the ability to locate and destroy targets around the clock in joint operations. The SAF has emphasized information technology, including C^4ISR programs, offensive IW, and SIGINT.[27] The SAF has also expressed interest in UAVs, including a huge battle management drone.

As this discussion demonstrates, Asian militaries are pursuing a range of niche capabilities, including advanced C^4ISR systems, long-range precision strike, information warfare, space support to terrestrial military operations, theater missile defense, and unmanned air warfare. Table 2 summarizes the militaries that appear active in these niches.

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[22] Robert Karniol, "Taiwan's Survival Strategy," *Jane's Defence Weekly*, September 13, 2000. See also Barbara Opall-Rome, "Support Mounts in Taiwan for Ballistic Missiles," *Defense News*, 26 April 1999 and Frank Umbach, "World Gets Wise to Pyongyang's Nuclear Blackmail," *Jane's Intelligence Review*, 1 October 1999.

[23] Karniol, "Taiwan's Survival Strategy,".

[24] "Taiwan Military to Form Cyber Warfare Unit," *Defense Systems Daily* (web based) (accessed November 30, 2000).

[25] "Taiwan Computer Viruses to Defend Against PRC Attack," AFP, January 9, 2000.

[26] See Chung-Yang Jih Pao (internet version), November 22, 1999.

[27] On Singapore's SIGINT capabilities, see Desmond Ball, *Developments in Signals Intelligence and Electronic Warfare in Southeast Asia*, Strategic and Defence Studies Centre Working Paper no. 290 (Canberra: Australian National University, December 1995), 16-18.

	Australia	China	Japan	Singapore	Taiwan
Advanced C4ISR	**X**	**X**	**X**	**X**	**X**
Precision-Strike	**X**	**X**		**X**	**X**
Information Warfare	**X**	**X**	**X**	**X**	**X**
Space Support	**X**[28]	**X**[29]	**X**		
Theater Missile Defense			**X**		**X**
Unmanned air warfare		**X**		**X**	

Table 2. Niches Being Pursued by Asian Militaries

DRIVERS OF THE DIFFUSION OF RMA IN ASIA

Each of the militaries that we studied in this project is pursuing the RMA for its own purposes (see Table 3). While motives differ, there are two common drivers of exploiting the RMA. First, Asian states are pursuing new approaches to combat in an effort to redress existing problems that defy a conventional solution. These include not only operational and strategic challenges, but also geographic and demographic predicaments. Second, they are attempting to exploit the benefits of new ways of war. These may include exploiting a comparative advantage in information technology or increasing interoperability with the United States.

[28] Through Australia's relationship with the United States.
[29] Including anti-satellite capabilities.

	Australia	Japan	Singapore	China	Taiwan
Threats and Challenges	Loss of qualitative superiority to adversaries. Reduced value of geographic depth. Low casualty tolerance.	Demographics. Low casualty tolerance.	Lack of depth, manpower.	Need to coerce, defeat Taiwan. Need to deter, defeat U.S. intervention. China's enemies pursuing RMA.	Need to counter Chinese missile, IW programs. Demographics.
Opportunities	Increase interoperability with US. Exploit C4ISR to master Australia's geography.	Spin-offs for private industry. Increase interoperability with US.			Exploit comparative advantage in IT. Cost savings of IW.

Table 3. Drivers of the RMA in Asia

The RMA presents Australia with both challenges and opportunities. First, Australian analysts believe that Australia is losing its qualitative edge over its regional neighbors. In the past, Australia could count upon enjoying a technological advantage over its adversaries. While the ADF will remain dominant in some niche capabilities, the proliferation of high-technology arms to the region is eroding Australia's edge. Second, the spread of long-range precision strike weapons, overhead reconnaissance capabilities, and information warfare is reducing Australia's ability to rely upon its strategic depth. Taken together, these trends argue for exploring new approaches to combat. Third, because the ADF is so small, it cannot afford to take heavy casualties or lose many platforms. Information-age ways of war appear to offer the ability to strike at a distance while reducing the prospect of casualties.

Pursuing the RMA also holds advantages for Australia. Foremost among these is the need to maintain (or improve) interoperability with the United States. As the U.S. armed forces modernize their information infrastructure, the ADF must keep up or risk reduced relevance. On the one hand, maintaining a high level of interoperability with the United States would enhance Australia's security. But it does come at a price. C^4ISR modernization is expensive. And, as Paul Dibb notes, resources expended on coalition

capabilities may come at the expense of those required for unilateral defense or regional peacekeeping.

Exploiting the RMA would also help Australia master its geography. As Coral Bell has observed, "the Revolution in Military Affairs offers the most promising set of systems yet evolved to solve Australia's permanent strategic dilemma: how to defend a very large territory and a long and vulnerable coastline with forces which will always remain very small by global or regional standards".[30] And as Michael Evans notes, information technology can provide the ADF with better surveillance of Australia's neighborhood and permit more efficient positioning and targeting of forces.

Japan, like Australia, faces a graying population. This, and a high sensitivity to casualties within Japanese society, is driving Tokyo to pursue ways of war that substitute technology for manpower. On the other hand, pursuing the RMA holds a number of benefits for Japan. First the development of information technology will benefit not only the JSDF, but also Japanese industry. Moreover, as with Australia, pursuing the RMA will increase interoperability with the U.S. armed forces and enhance Japanese security.

Singapore seeks to exploit the emerging RMA to ensure the state's survival in a hostile regional environment. Specifically, the SAF is interested in developing new ways of war to compensate for Singapore's lack of depth and shortage of manpower. Precision-guided munitions, electronic warfare, and information warfare offer Singapore the ability to deter and defend against its much larger neighbors. In addition, the SAF hopes to use the modernization of its information infrastructure as a means to enhance cooperation with regional powers, presumably including the United States.

China's primary motivation for pursuing the RMA is the need to coerce and (if necessary) defeat Taiwan while also deterring and (if necessary) defeating U.S. intervention in the conflict. China can more effectively strike Taiwan with precision-guided munitions and information warfare than with its air force, navy, and army. Moreover, the fact that those countries that are most vigorously pursuing the RMA are China's enemies also provides an impetus to Beijing to pursue new ways of war.

The main driver of Taiwan's exploitation of the emerging RMA is its need to counter China's missile and information warfare programs. As Arthur Ding and James Mulvenon note, Taiwanese defense analysts perceive an imminent threat of attack by Chinese missiles and information operations. In addition, Taiwanese defense analysts see the RMA as a way to offset Taiwan's unfavorable demographic situation. Not only is Taiwan much smaller than mainland China, it also faces declining population growth and a decline in the pool of available draftees.

On the other hand, pursuing the RMA contains a number of potential benefits for Taiwan. Taiwan has a comparative advantage in information technology. Indeed, it is one of the most "wired" countries in the world, has one of the world's most advanced information infrastructures, and ranks eighth in terms of the number of Internet users. Taiwan's pursuit of the RMA – and information warfare in particular – is seen as a way of

[30] Coral Bell, "Security Regionalisation and the Future of the Australian Defence Forces", *Australian Defence Force Journal* no. 143 (July/August 2000): 21.

exploiting these comparative advantages. The Taiwanese military also sees IW as a low-cost approach to combat.

CONSTRAINTS ON INNOVATION

Just as each of the militaries we have studied is pursuing the RMA for different reasons, so too do they face political, economic, military, and socio-cultural constraints on innovation (see Table 4).

	Australia	**Japan**	**Singapore**	**China**	**Taiwan**
Political	Low defense spending. Lack of agreed upon national security vision.	Japanese constitution.		Dominance of People's War	Diplomatic isolation. Export restrictions. Declining defense budget.
Economic		Weak economy.		Limited technology base.	Strained resources. Insufficient indigenous technology base.
Military	Service culture Block obsolescence of major systems.	Split within JSDF over RMA.	Military organizational culture.	Decision making dominated by ground commanders, People's War	Military organizational culture.
Social/ cultural	"ANZAC Spirit"		Lack of innovation. Hierarchical culture	Poor education and training. Lack of S&T infrastructure.	Overly rigid society.

Table 4. Constraints on the diffusion of the RMA in Asia

Australia faces political and military constraints on its exploitation of the RMA. First, any attempt to exploit new ways of war will have to contend with some stark fiscal realities. The Australian defense budget is currently less than 2% of GNP and is unlikely to grow significantly. Because the Australian government has chosen to field a fairly robust force within these limits, much of the defense budget is spent on current operations. As a result, the ADF will face some stark choices in the short term.

Second, the ADF lacks a single, unifying conception of Australia's interests. Historically Labour governments have taken a narrow view, equating security with territorial defense, while the Conservative Party has been more expansive. Similarly, each service has its own concept of Australian security, that of the navy being most expansive and that of the army the narrowest.

Third, Australia faces a number of organizational constraints on innovation. The Australian armed services, like their counterparts across the globe, resist changes that threaten cultural norms and disrupt hierarchies.

At a deeper level, the information age challenges the core beliefs of the ADF. Central to the ADF is the concept of the "ANZAC Spirit", which places a premium on the skill and initiative of the individual soldier. This culture is likely to be of decreasing importance in the future, and may even become dysfunctional.

Despite growing interest in transformation in Japan, such efforts face substantial political, legal, and social barriers. For example, Japan's constitution prevents it from acquiring offensive weapons. Moreover, as Sugio Takahashi points out, supporters of exploiting the RMA are a minority within the JSDF. Japan's sluggish economy also poses a major brake on efforts to modernize the Japanese armed forces. And while Tokyo is a world leader in information technology, Japanese weapon development has at times been glacially slow. Any attempt at transformation will thus face daunting challenges.

While Singapore appears to be pursuing information technology quite aggressively, it nonetheless faces military and socio-cultural barriers of its own. While the SAF is perhaps the best-equipped and trained military in the region, its organizational culture, which values hierarchy and discipline over innovation, is a weakness. Similarly, while the SAF has embraced new technologies and weapon systems, it has shown less willingness to innovate doctrinally or organizationally.

China faces constraints upon its exploitation of the RMA as well. For example, Andrew Yang argues that China's scientific and technical infrastructure represents a significant weakness. In his view, the Chinese government provides insufficient funding to high-technology projects. Moreover, the PLA suffers from a lack of well-trained scientists and a backwards research and development infrastructure.

Less concretely, the PLA faces a number of political and cultural barriers to the adoption of new ways of war. These include the fact that many in leading positions in the PLA have a vested interest in the *status quo*. In particular, Yang has pointed out that officers who equate Chinese security with homeland defense currently dominate China's national security decision making. Moreover, the fact that ground force commanders have a near monopoly on power within the PLA limits the voice of the navy and air force in decision-making.

Taiwan faces a range of constraints in its efforts to exploit the RMA. Taiwan's diplomatic isolation and restrictions on the export of weapons to Taiwan both limit Taipei's ability to exploit the information revolution. A declining defense budget, strained scientific and technical resources, and a limited indigenous technology base compound the problem.

Like the other states in this study, perhaps the most intractable problems that Taiwan faces are cultural. As both Arthur Ding and James Mulvenon note, efforts to develop information warfare have encountered opposition from traditionalists within Taiwan's armed forces. Overly rigid discipline and lack of innovation within the military has been another problem. As a result, Taiwan's development of IW has emphasized technology over doctrine and organizational coordination.

WHITHER THE RMA IN ASIA?

As the papers commissioned for this project indicate, a number of factors could accelerate or retard the spread of information-age ways of war in Asia. These include:

- The degree of U.S. progress in exploiting the RMA
- The level of U.S. engagement in the region
- The threat environment in the region
- The priority that various regional powers accord to current vs. future challenges.
- The economic situation in the region.

Two drivers seem particularly important: the extent of U.S. progress in exploiting the RMA and the threat environment in the region. Most obviously, the extent and nature of U.S. defense transformation will affect the ability of the United States to dissuade, deter and defeat threats to its interests within the region. It will also influence the actions of both allies and adversaries. Allies will face the choice of whether to adopt U.S. weapons, concepts, and organizations, in whole or in part. They will also face the choice of whether to maximize interoperability with the transformed U.S. armed forces or whether to accept a niche role. The extent of U.S. defense transformation will also influence the calculus of potential adversaries. Potential adversaries will need, for example, to adjust their competitive strategies to take into account new approaches to combat. An adversary would, for example, have to adjust his anti-access strategy to accommodate the development by the United States of approaches to power projection that rely less heavily upon regional basing.

China's future power will also influence the spread of the RMA in the region. Whether China is strong or weak will most obviously affect the range of options open to Beijing. It will also shape the attitudes of other regional powers as well as their willingness to align with the United States.

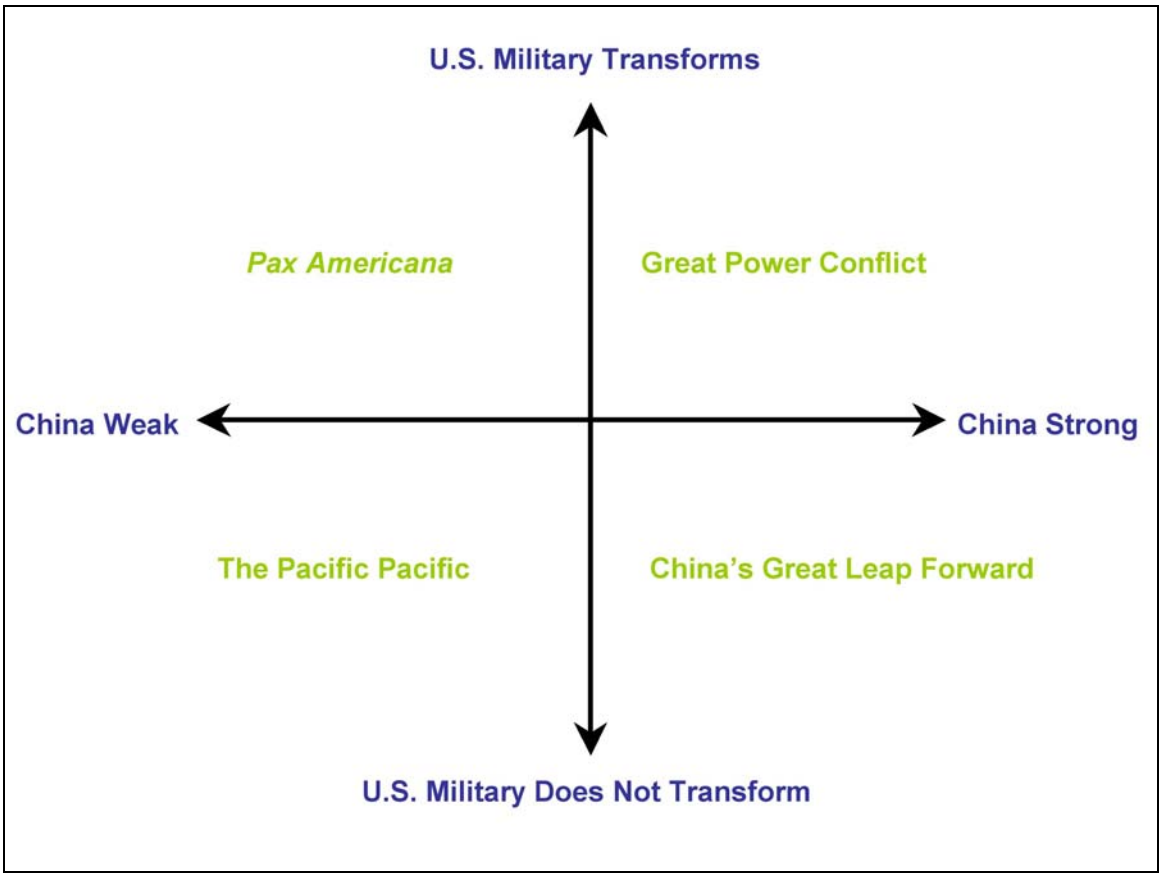

Figure 1. Potential scenarios

By varying these two drivers we can construct four alternative futures for the RMA in Asia:

- *Pax Americana* (U.S. Military Transforms and China is weak)
- Great Power Conflict (U.S. Military Transforms and China is strong)
- China's Great Leap Forward (U.S. Military Does Not Transform and China is strong).
- The Pacific Pacific (U.S. Military Does Not Transform and China is weak).

In the *Pax Americana* scenario, the U.S. armed forces transform to exploit the information revolution by developing new approaches to and organizations for combat. United States chooses to emphasize transformation of the U.S. armed forces. The result is a stratification of Asian militaries, a trend accentuated by the economic constraints under which most Asian states operate. The United States occupies the top rung of the military hierarchy and others cannot even come close to matching U.S. capabilities. Some states, such as Japan, Taiwan, Singapore, and Australia, make some progress in developing information-age ways of war. China and India straddle the divide between industrial- and information-age militaries. Other Asian militaries make little to no progress in exploiting the emerging RMA.

The combination of a weak China and growing cooperation between the United States and Russia makes this an attractive future for Asia. There continue to be disputes among Asian powers over territory and resources, to be sure, but by and large they are handled peacefully. The United States, and to a lesser extent Japan, Taiwan, Singapore, and Australia, rely increasingly upon precision-guided munitions and information warfare to deter conflict. In the case of Japan, the acquisition of such a capability dampens calls for Tokyo to acquire nuclear weapons.

The Great Power Conflict scenario grows out of the transformation of the U.S. military coupled with a significant increase in China's economic and military power. As the name of this scenario implies, the prospect of a conflict with China overshadows all other contingencies. The United States establishes closer and more formal relations with Taiwan, including expanded military cooperation. Singapore, meanwhile, is torn between China and the United States.

As with the previous scenario, Washington's efforts to adopt information-age warfare leave everyone else in the region behind. In this case, however, allies have a greater incentive to balance the growing power of China. Japan and Australia increase their defense budgets substantially. Moreover, the United States transfers cutting-edge technologies to them in an attempt to bolster their capabilities. U.S. allies also adopt U.S. RMA concepts and organizations. While such measures help, it is clear that U.S. allies in the region are unable to stand up to China on their own. As a result, the United States increasingly relies upon extended deterrence based upon precision-guided munitions and information warfare to protect its allies.

China's Great Leap Forward comes about as a result of a growth in Chinese power combined with the failure of the United States to exploit fully the information revolution. In this scenario the U.S. armed forces choose to emphasize legacy platforms over exploiting the RMA. Japan and Australia generally follow the U.S. lead. Singapore continues to develop a "system of systems" to preserve its sovereignty. China, by contrast, puts considerable effort into developing new ways of war, such as precision-guided munitions, space weapons, stealthy platforms, and information warfare. The PLA also invests considerable sums in so-called "assassin's mace" weapons. As a result, China is able to steal a march on the United States. The United States finds itself increasingly reliant upon nuclear weapons as a deterrent to aggression.

In 2009, China uses a combination of ballistic and cruise missiles, information warfare, diesel submarines, and fourth-generation aircraft to coerce Taiwan's leadership into renouncing independence and reunifying with the mainland. The United States belatedly becomes involved in the conflict, only to suffer thousands of casualties when China sinks an aircraft carrier in a precision-guided ballistic missile strike. The seeming impotence of the United States breeds a perception of American impotence throughout the region. Some regional powers, such as Japan and Singapore, increasingly accommodate China, while others, such as Australia, India, and Vietnam, retrench.

In the final scenario, titled the Pacific Pacific, China is weak and the United States and its allies emphasize counter-terrorism and peacekeeping over preparing for high-intensity conflicts. Australia configures its forces to deal with the so-called Sea of Instability –

Indonesia, Papua New Guinea, East Timor, Bougainville, Fiji, and the Solomons – that lies in its backyard. Japan and Singapore concentrate on battling terrorism.

CONCLUSION

Australia appears to be the farthest along at institutionalizing new ways of war, followed by China. Singapore has also made great strides toward fielding an information-age military. Japan and Taiwan's efforts have been much more limited.

This project has revealed a diversity of attitudes toward the emerging RMA in Asia. States in the region are pursuing new ways of war in response to a range of drivers and constraints. If the history of past revolutions of warfare is a guide, the tendency toward divergence in military technology, doctrine, and organization is likely to continue until there is a convincing battlefield demonstration of some new way of war. It is only after such a demonstration that we would expect a "model" to spread throughout the region.